REMARKS

Claim 11 has been amended to overcome the 35 U.S.C. §112 objections, as required by the Examiner.

The rejection of Claim 8, as being obvious and unpatentable based upon the Ichiyama '784 patent in view of the Kuwayama et al. '793 patent under 35 U.S.C. 103(a) is respectfully traversed. Further, the rejection of Claim 13 as being anticipated based upon the Kuwayama et al. '793 patent under 35 U.S.C. 102(b) is also respectfully traversed.

The Ichiyama '784 patent does not disclose or teach the following elements of amended Claim 8:

a) the storage space between the outer surface of the ceramic axial tube and the inner surface of the ceramic axial support is within the range of 2-25 μm for dispersing lubricants therefrom.

The Ichiyama '784 patent discloses a fluid dynamic pressure bearing assembly having a shaft member, a sleeve member which is relatively rotatable to the shaft member, and radial and thrust fluid dynamic pressure bearings thereto. Additionally, a lubricating oil retaining channel is provided to retain and disperse the lubricating oil by capillarity. A section of the retaining channel is open to the atmosphere and the other section is communicated with each of the fluid dynamic pressure bearings. The retaining channel is formed on the shaft member or within the shaft member.

In addition, there is no teaching in the Ichiyama patent that the storage space for the lubricating oil is between the outer surface of the ceramic axial tube and the inner surface of the ceramic axial support member, as claimed in the present invention. As shown in Ichiyama's patent drawing of Figure 1, the storage space (retaining channel 40 for retaining oil therein) is formed on the top of a bar-shaped member 42, where then the lubricating oil is dispersed to the fluid dynamic pressure bearings 24, 26 and 28. The present invention pertaining to its structure is completely different with regard to its lubricating oil storage space (see applicant's Figure 4) as compared to the Ichiyama's lubricating oil storage space 40 (see Ichiyama's Figure 1).

Additionally, there is no teaching in the Ichiyama patent that the storage space between the walls for lubrication oil has a radial distance of 2 to 25 μm, as Ichiyama is silent on this parameter.

The Kuwayama et al. '793 patent does not disclose or teach the following elements of amended Claim 8:

a) a ceramic axial support tube which may rotationally support the ceramic axial tube, wherein a storage space for lubricants is defined by an inner surface of the ceramic axial support and the concave on the outer surface of the ceramic axial tube; and

b) the storage space between the outer surface of the ceramic axial tube and the inner surface of the ceramic axial support tube is within the range of 2-25 μm for dispersing lubricants therefrom.

The Kuwayama et al. '793 patent discloses a high speed rotor assembly having a stationary shaft (axial support) 12 and a rotary shaft (axial tube) 13 being made of ceramic for the purpose of preventing dead lock.

In addition, there is no teaching in the Kuwayama patent that the storage space (bearing gap 22) for the lubricating oil is between the outer surface of the ceramic axial tube 13 and the inner surface of the axial support member 12, as shown in Kuwayama 's patent drawing of Figure 1. Kuwayama's bearing gap 22 is not used for dispersing or receiving lubricating oil therein but for receiving a pressure flow gradient therebetween.

Additionally, Kuwayama's bearing gap 22 having a 2 to 25 μm parameter relates to load bearing rotational stability and not to a storage space for dispersing lubricating oil to the high speed rotor assembly.

For these reasons, Claim 8 is patentable.

The Kuwayama et al. '793 patent does not disclose or teach the following elements of amended Claim 13:

a) at least one ceramic axial support which rotationally supports the ceramic axial tube by a rotational corresponding spacing within the range of 2-25 μm which defines a lubricating chamber for receiving lubricant; and

b) means for allowing the lubricant to leak onto the outer surface of the ceramic axial tube.

As previously discussed, the Kuwayama et al. '793 patent discloses a high speed rotor assembly having a stationary shaft (axial support) 12 and a rotary shaft (axial tube) 13 being made of ceramic for the purpose of preventing dead lock.

Moreover, there is no teaching in the Kuwayama patent that the storage space (bearing gap 22) for the lubricating oil is between the outer surface of the ceramic axial tube 13 and the inner surface of the axial support member 12, as shown in Kuwayama 's patent drawing of Figure 1. Kuwayama's bearing gap 22 is not used for dispersing or receiving lubricating oil therein but for receiving a pressure flow gradient therebetween.

Additionally, Kuwayama's bearing gap 22 of 2 to 25 μm relates to load bearing rotational stability and not to a storage space for dispersing lubricating oil to the high speed rotor assembly.

Further, there is no teaching that Kuwayama's structure has means for allowing the lubricant oil to leak onto the outer surface of a ceramic axial tube. Kuwayama 's high speed rotor assembly does not use lubricating oil to lubricate its structure.

For these reasons, Claim 13 is patentable.

CONCLUSION

Claims 1 to 7 have been allowed.

As to independent Claims 8 and 13, even if the prior art and references of Ichiyama and Kuwayama et al. are combined, they still do not teach or disclose the claimed features of amended independent Claims 8 and 13, and the claims which depend therefrom. For these reasons, it is respectfully submitted that applicant's amended independent Claims 8 and 13 should be allowed.

Respectfully submitted,

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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

8(Amended). A supporting device of a rotor, which comprises:

a) a ceramic axial tube which is a hollow tube with one end fixed on the rotor and is formed with at least one concave on [the] an outer surface; [and]

b) a ceramic axial support which may rotationally support [the] said ceramic axial tube, wherein a storage space for lubricants is defined by [the] an inner surface of [the] said ceramic axial support and [the] said concave on said outer surface of [the] said ceramic axial tube; and

c) said storage space between said outer surface of said ceramic axial tube and said inner surface of said ceramic axial support is within the range of 2-25 μm for dispersing lubricants therefrom.

11(Amended). The supporting device of the rotor of Claim 8, wherein [the] said concave is formed in [the] a middle circular concave [part] section of [the] said ceramic axial tube.

13(Amended). A supporting device of a rotor, which comprises:

a) a ceramic axial tube which is a hollow tube with one end fixed on the rotor[,]; [and]

b) at least one ceramic axial support which rotationally supports [the] said ceramic axial tube by a rotational corresponding spacing within the range of 2-25 µm which defines a lubricating chamber for receiving lubricant; and

c) means for allowing the lubricant to leak onto the outer surface of said ceramic axial tube.

VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

ABSTRACT OF THE DISCLOSURE

A supporting device of a rotor [is proposed, which comprises] includes a ceramic axial tube fixed on the rotor, and a ceramic axial support rotationally supporting the ceramic axial tube, wherein the spacing between the ceramic axial tube and the ceramic axial support is within the range of 2-25 μm so as to [indeed] prevent shaking and reduce noise. The ceramic axial tube formed as a hollow tube is allowed to store lubricants within the inner space of the tube, and further reduce frictional noise and heat production. In addition, the ceramic axial tube formed as a hollow tube is also advantageous for binding with the fan body during the molding process of the fan rotor.